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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,850	10/24/2001	Kais Jameel Maayah	65.0323	9831
32588	7590	12/01/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			CHAWAN, SHEELA C	
			ART UNIT	PAPER NUMBER
			2625	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/682,850

**Applicant(s)**

MAAYAH ET AL.

**Examiner**

Sheela C Chawan

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 January 1947.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 18-47 is/are rejected.
- 7) ☒ Claim(s) 16 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because of draftsperson's remarks see attached PTO- 948 10/12/04. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. Claims 1- 47 are objected to because of the following informalities:

Claim 1 is objected to because of the following informalities:

In claim 1, line 1, change "c1", to -- 1 --.

Similarly all the claims need to be corrected.

Appropriate correction is required.

### ***Claim Rejections - 35 U.S.C. § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if

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the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-15 and 18- 47 are rejected under 35 U.S.C. 102(e) as being anticipated by Shishido et al., (US. 6,614,923).

As per claim 1, Shishido discloses a method for defect inspection of microfabricated structures (note microfabricated structures corresponds to semiconductor wafer fig 1, 100 is a test object) having repetitive and non-repetitive regions (column 1, lines 60 – 65, column 8, lines 37- 46), the method comprising:

- a. determining a contrast threshold (column 12, lines 9-25, column 4, lines 43- 46, fig 9);
- b. acquiring contrast data from the micro fabricated structures (column 12, lines 9- 25);
- c. thresholding the contrast data with the contrast threshold to create a mask of non-repetitive regions of the contrast data (fig 9, column 4, lines 43- 46, fig 9, column 12, lines 9-25);
- d. masking the contrast data with the mask to create masked regions and unmasked regions of the contrast data (column 14, lines 28- 67); and
- e. Comparing the unmasked regions of the contrast data with reference data to detect defects in the repetitive regions of the microfabricated structures and to create defect data (column 13, lines 38- 62, column 19, lines 4- 45, column 29, line 58 through column 30, line 52).

As to claims 2, 20, 32 and 44, Shishido discloses the method, wherein the micro fabricated structures are on a semiconductor wafer (fig 1, 100 test object corresponds to semiconductor wafer).

As to claims 3, 18, 25, 31, 37 and 43, Shishido discloses the method, wherein the acquiring contrast data step is performed with an e-beam inspection system (fig 1, 30, corresponds to electron beam).

As to claims 4, 19, 35 and 47, Shishido discloses the method, further comprising reporting the defect data (column 2, lines 42- 50).

For claim 5 see the above rejection for claim 1.

As to claims 6, 25-26 and 38 Shishido discloses the method, wherein the reference data are repetitive cells in the repetitive regions (column 9, lines 20- 35).

As to claim 7, Shishido discloses the method, further comprising finding non-repetitive regions in the contrast data and comparing the non-repetitive regions of the contrast data with non-repetitive reference data (column 13, lines 38 - 62).

As to claims 8, 27 and 39, Shishido discloses the method, wherein the analyzing step includes using a cell-metric to find the repetitive regions of the contrast data (fig 2, column 6, lines 47- 64).

As to claims 9, 28 and 40, Shishido discloses the method, wherein the analyzing step includes using at least one of an X and Y cell size to find the repetitive regions of the contrast data (column 8, lines 4- 65).

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As to claim 10, Shishido discloses the method, wherein the analyzing step includes using at least one of a cell repetition spatial frequency and a harmonic of a cell repetition spatial frequency to find repetitive regions of the contrast data (fig 16 a and b).

As to claims 11, 29 and 41, Shishido discloses the method, wherein the analyzing step includes using a range of the contrast data to find the repetitive regions of the contrast data (column 29, line 58 through column 30, line 41).

As to claim 12, Shishido discloses the method, wherein the analyzing step includes using a range of the contrast data calculated over a window to find the repetitive regions of the contrast data (column 8, lines 4- 65, fig 27 a and b, column 37, lines 30- 62).

As to claim 13, Shishido discloses the method, wherein the analyzing step includes using a range of the contrast data calculated over a cell-sized window to find the repetitive regions of the contrast data (fig 27 a and b, column 8, lines 4-65, column 37, lines 30-62).

As to claim 14, Shishido discloses the method, wherein the analyzing step includes using a cell template to find the repetitive regions of the contrast data (column 9, lines 20-67).

As to claims 15, 30 and 42, Shishido discloses the method, wherein the analyzing step includes creating at least one profile of a cell-metric of the contrast data and thresholding the profile to find repetitive regions in the contrast data (fig 26a and b, column 36, line 45 through column 37, line 62).

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As to claims 22, 33 and 45 Shishido discloses the method, wherein the acquiring step comprises acquiring contrast data with an integer number of pixels across a single repeated cell of the microfabricated structure (column 17, lines 3-25, column 20, lines 14- 16, column 27, lines 15-16).

For claim 23, claim 23 recites similar limitation as claim 1 above and similarly analyzed. Shishido teaches the step of a) acquiring contrast data from the semiconductor wafer (fig 1, 100 corresponds to semiconductor wafer), with an e-beam defect inspection system (fig 1, 30, corresponds to electron beam);

b). reporting the locations of the defects (column 2, lines 42- 50).

For claim 24, claim 24 recites similar limitation as claim 1 above and similarly analyzed. Shishido teaches the step of an XY stage disposed to support the microfabricated structures for inspection (fig 1, 131, corresponds to X stage, column 7, lines 42- 43);

- a microscope and detector to acquire contrast data of the microfabricated structures (fig 1, 108 corresponds to optical microscopic, column 7, lines 23- 28) ;
- an image computer (fig 1, 104), equipped with stored program instructions for processing the contrast data to detect defects in the microfabricated structures (column 11, lines 1-55), the processing comprising analyzing automatically the contrast data to find repetitive regions of the contrast data and comparing the repetitive regions with repetitive reference data to the detect defects in the microfabricated structures (column 9, lines 19- 67).

As to claim 36 see the rejection of claim 24 above.

As to claim 34 and 46, Shishido discloses the defect inspection system wherein the processing further comprises analyzing automatically the contrast data to find non-repetitive regions of the contrast data and comparing the non-repetitive regions with non-repetitive reference data to the detect defects in the microfabricated structures (fig 9, column 4, lines 43- 46, column 12, lines 9-25, column 24, lines 21-30, column 29, line 58 through column 30, line 52).

***Allowable Subject Matter***

4. Claims 16,17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Other prior art cited***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tsai et al., (US.4,845,558) discloses method and apparatus for detecting defects in repeated microminature patterns.

Nara et al., (US.6,388,747 B2) discloses inspection method, apparatus and system for circuit pattern.

Shishido et al., (US.6,376,854B2) discloses method of inspecting a pattern on a substrate.




**Contact Information**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela C Chawan whose telephone number is 703-305-4876. The examiner can normally be reached on Monday - Thursday 8 - 6.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 703-308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Sheela Chawan  
Patent Examiner  
Group Art Unit 2625  
November 26, 2004